

MMP-9, TIMP-2, and TIMP-4 were assayed using the ELISA technique. Patients were divided into failed and matured groups, depending on clinical end points. Successful maturation was considered in patients who had at least three successful hemodialysis access episodes. MMP/TIMP ratios were calculated as an index of the MMP axis activity because MMP activity parallels alterations in their TIMPs.

Results: Of the 20 patients who were enrolled, 13 had successful maturation, and 7 had failure of AVF maturation. Significantly higher serum levels of MMP-2/TIMP-2 were found in patients who had AVF that matured compared with those that failed ($P = .003$). Similarly, a trend toward increased serum levels of MMP-9/TIMP-4 was found in patients with successful AVF ($P = .06$; see Fig).

Conclusions: These data show that serum MMPs and the associated inhibitors could potentially play a role as a biomarker for future AVF maturation.

Blunt Abdominal Aortic Injury

Sherene Shalhub, MD, Rachel Lundgren, MD, Samantha Quade, MD, and Benjamin Starnes, MD, Vascular Surgery, University of Washington, Seattle, WA

Objective: Blunt abdominal aortic injury (BAAI) is rare, with fewer than 200 cases in the current reported world literature. It is most often seen in high-speed motor vehicle collisions, and is associated with major blunt intra-abdominal injury and thoracolumbar fractures. We report our institutional experience over the past decade.

Methods: Of the 141 cases with blunt aortic injury presenting from 1999 to 2008, we retrospectively reviewed all cases with BAAI. Data collected included demographics, mechanism of injury, associated injuries, ISS, type of intervention, procedural complications, and subsequent CT imaging.

Results: We identified BAAI in 17 patients (41% female). Average age was 32 years (range, 6-79), and 71% were due to motor vehicle collisions. At presentation, 40% were hypotensive. Average ISS was 49 (range, 16-75). Associated abdominal injuries were seen in 81%, and more than half had associated spinal injuries. Injury presentation ranged from intimal tears (29%), intimal flaps >10 mm (29%), and pseudoaneurysms (18%), to free rupture (24%). Treatment was nonoperative in 24%, and operative in the majority of cases: 41% open aortic repair, 29% endovascular repair, and one hybrid repair with visceral debranching. Overall mortality was 29%, with most occurring in the emergency department. Free aortic rupture mortality was 100% by hospital day 4. Procedure-related complications were one endoleak treated with another stent graft, and visceral bypass thrombosis in the hybrid repair case, leading to death. Follow-up imaging was available in 80%. All intimal tears treated nonoperatively healed, a large intimal flap treated nonoperatively remained stable, and six patients who underwent repair of their aortic injury had complete resolution and healing of their injury.

Conclusions: This is one of the largest series described in the literature. BAAs range from small intimal tears to free rupture, with outcomes correlating with injury severity. Nonoperative management was successful in patients with intimal tears. Free rupture is associated with the highest mortality risk. For all other categories of aortic injury, successful repair correlates with a favorable prognosis.

Failure to Rescue: Physician Specialty and Mortality After Reoperation for Abdominal Aortic Aneurysm (AAA) Repair

Matthew W. Mell, MD, Amy Kind, MD, Christie M. Bartels, MD, and Maureen A. Smith, MD, MPH, PhD, Division of Vascular Surgery, Stanford University, Stanford, CA, and University of Wisconsin, Madison, WI

Objectives: Complications after AAA repair resulting in reoperation contribute to mortality, but have not been well studied. Mortality after reoperation is termed failure to rescue, and may reflect differences in outcome directly related to management of the complication. This study describes the relationship between reoperation and mortality and demonstrates the effect of physician specialty on reoperation rates and failure to rescue after AAA repair.

Methods: Data were extracted for 2616 patients who underwent intact AAA repair in 2005-2006 from a standard 5% random sample of all Medicare beneficiaries. Patient demographics, comorbidities, type of repair, and specialty of operating surgeon were collected. Primary outcomes were 30-day reoperation and 30-day mortality. Logistic regression analysis identified characteristics predicting reoperation.

Results: A total of 156 reoperations were required in 142 patients (4.2%). Early mortality was far more likely after reoperation (22.5% vs 1.5%; $P < .0001$). Of patients requiring reoperation, those requiring two or more interventions had an even higher mortality (54% vs 20%; $P = .0007$). Despite equivalent need for reoperation among specialties (vascular surgeons, 5.2%; others, 5.6%; $P = .67$), the mortality after reoperation was nearly half for vascular surgeons compared with other specialties (16.2% vs 32.3%; $P = .04$). The most common reason for reoperation was arterial complications

(35.8%; mortality, 39.3%), which also accounted for the largest difference in mortality between vascular surgeons (30.7%) and other specialties (52.0%).

Conclusions: Postoperative complications requiring reoperation dramatically increase mortality after AAA repair. Lower mortality after reoperation in patients managed by vascular surgeons reflects the importance of specialty vascular care. Failure to rescue contributes to the difference in outcome given equivalent complication rates.

Clinical Outcomes and Volumetric Analysis of Endoluminal Exclusion of Acute Complicated Type B Descending Thoracic Aortic Dissections

Karen M. Kim, MD, Carlos E. Donayre, MD, Tyler S. Reynolds, MD, George E. Kopchok, Irwin Walot, MD, Joe P. Chauvapum, MD, and Rodney A. White, MD, Harbor UCLA Medical Center, Torrance, CA

Objective: Late clinical outcomes and structural changes within the aorta after thoracic endovascular aortic repair (TEVAR) for acute complicated type B descending thoracic aortic dissections (ADTD) remain unknown. The goal of the study is to review and analyze the clinical outcomes and the volumetric data of patients with ADTD.

Methods: From 2002 to 2009, 41 consecutive patients with ADTD, all with at least 1 year of follow-up, were treated as a part of a single center FDA-approved IDE. Indications were malperfusion ($n = 17$), rupture ($n = 12$), chest pain ($n = 6$), acute enlargement ($n = 4$), and uncontrolled hypertension ($n = 2$). Duration of symptoms was ≤ 14 days. We analyzed 3-D M2S CT reconstructions for aortic volume and diameter changes, regression of the false lumen, and expansion of the true lumen.

Results: Thirty-two patients (78%) required emergent surgery, with one death at induction. Procedural success rate was 97%. The 30-day mortality was 14% for malperfusion, 25% for rupture, and 0% for all others, with late mortality of 0%, 25%, and 25%, respectively. Mean follow-up was 18 months. Permanent stroke and paraplegia rates were 4.9% ($n = 2$) and 0%. Ten of 18 secondary interventions were performed for 5 proximal endoleaks, 1 distal cuff endoleak, and 4 distal reperforations. For 33 patients without endoleaks, the true lumen volume grew by 29% at 1 month, 51% at 1 year, and 80% at 5 years. Volume regression of the false lumen was 69%, 76%, and 86%, respectively. The true lumen volume did not change at 1 month or 1 year in the endoleak group ($n = 7$) but increased 50% at 2 years after secondary intervention. A 10% reduction of abdominal aortic volume distal to endograft occurred over 5 years in the absence of endoleaks.

Conclusions: TEVAR offers a promising solution to patients with ADTD. Aortic morphologic changes occur shortly after TEVAR and remain predictable up to 5 years with continuous expansion of the true lumen and regression of the false lumen. A lack of increase in the true lumen volume is associated with endoleaks or distal reperfusion.

Gender-based Outcomes Following Endovascular Repair of Degenerative Thoracic Aneurysms

Karthikeshwar Kasirajan, MD, Emory University School of Medicine, Atlanta, GA

Sponsored by: Peter Schneider, MD

Objective: The extent to which patient gender influences endograft treatment of TA has not been reported. The current study analyzed the influence of gender on the endovascular management of thoracic aneurysms.

Methods: A total of 421 patients (265 males [M] and 156 females [F]) were enrolled as part of the TAG (WL Gore, Flagstaff, AZ) thoracic stent graft trials. Preoperative risk factors, intraoperative events, and 365-day follow-up data were analyzed.

Results: The mean maximal aneurysm diameter was comparable (M, 63; vs F, 60 mm; $P = .09$). Among 22 different preoperative risk factors evaluated, women had a lower incidence of prior vascular procedures ($P = .004$), and a trend was noted towards lower coronary artery disease and smoking ($P = .09$, $P = .08$). Mean proximal and distal landing zone diameters and iliac access diameters (M, 9.2; vs F, 7.6 cm) were smaller in women ($P < .001$). Conduits were required more frequently among women (M, 6%; vs F, 24%; $P < .001$). Local access site complications were significantly higher in women, most related to vascular trauma (M, 2%; vs F, 12%). Overall length of stay was prolonged in women (M, 4.8; vs F, 5.5 days; $P = .001$). However, this did not result in any difference between genders in the technical success rate (device delivery and successful aneurysm exclusion) or any other major adverse event rate ($P = .82$) at 30 and 365 days. Survival at 1 year was comparable (M, 91%; vs F, 87%; $P = .229$).

Conclusion: No significant difference in major end points was noted at 1 month and 1 year on gender-based analysis for thoracic stent graft therapy. Local access complications may have been related to the smaller access vessels diameter for female patients. A great attention to detail for the access site in women and a lower threshold for elective conduit may be a more prudent approach.